

INSIDE: RESTORING UTAH'S WATERSHEDS

UTAH DIVISION OF WILDLIFE RESOURCES • WINTER 2005

wildlife

R E V I E W

Cheatgrass

Threatening homes & stealing rangelands

Opportunity

Two programs that will help Utah's wildlife

Rangelands

Coming together to tackle difficult issues

Wildlife Review

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Cover photo: Mule deer fawn

Photo, right: Avocets at Farmington Bay,
Phil Douglass

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A large flock of avocets is captured in flight over a body of water. The birds are white with black wings and long, thin legs. They are flying in various directions, creating a sense of movement and activity. The water below is calm, reflecting the sky and the birds.

2 Director's message
Two separate programs provide opportunities
to help Utah's most threatened wildlife.

3 Wildlife planning
The new Watershed Initiative will help restore
important Utah habitats.

6 Losing western wildlife
Thousands of acres of dying sagebrush could
mean losing wildlife that defines the West.

INSIDE

Winter 2005



12 **Cheatgrass**

This invasive Mediterranean grass is outcompeting Utah's native rangeland vegetation.

15 **Deseret Land & Livestock**

A profitable livestock ranch that also provides tremendous benefits for wildlife.

18 **Rangelands**

Coming together to tackle the difficult issues of Utah watersheds and wildlife habitats.

22 **Volunteers**

Dedicated Hunters contribute time and effort to improve a wetland treasure near Utah Lake.

25 **Project WILD**

Ecosystems: seeing the relationship of all the pieces in the puzzle.

“Habitat loss
and degradation
is the most
significant
problem facing
wildlife in
Utah.”

DIRECTOR'S MESSAGE



THANK YOU for reading the *Wildlife Review*. This issue focuses on the importance of habitat to Utah's wildlife. Habitat loss and degradation is the most significant problem facing wildlife in Utah. And the damage that habitat loss is causing our watersheds threatens not just our wildlife, but also the quality of life in Utah.

The Watershed Initiative aggressively deals with this statewide problem by conducting large-scale improvement projects on thousands of acres of rangelands and watersheds. The Division of Wildlife Resources is committed to providing the personnel and securing the funding needed to make this program a success.

One of the articles in this issue focuses on sagebrush and

emphasizes the importance of quality habitat for mule deer, sage-grouse and other native species. Sage-grouse populations in Utah have suffered dramatic declines over the last 30 years due to a combination of habitat loss and gradual degradation of vast areas of shrubsteppe rangelands.

Mule deer populations also have struggled in recent years because of a significant loss of critical winter range habitat. Many of our mule deer populations depend on these same shrubsteppe rangelands for winter forage.

To get the Watershed Initiative off to a strong start, the Utah State Legislature provided \$2 million in funding. These funds were matched with over \$6 million from government agencies, private landowners and sportsmen's organizations. With these funds, we will be able to complete habitat improvement projects on over 100,000 acres of critical rangelands and watersheds this year.

So, enjoy reading about these important habitat issues and keep your eyes open for one of the many habitat projects in progress around the state.

James F. Karpowitz
UDWR Director

A handwritten signature in dark ink that reads "Jim Karpowitz".

By **DANA DOLSEN**
Planning Manager

Wildlife planning

Seizing two big opportunities to help Utah's wildlife

AN OPPORTUNITY to help Utah's most sensitive wildlife and the areas in which they live is knocking at the door through two programs that have come together at just the right time.

Two programs, one target

Responding to declines in wildlife populations across the state and concerns about the health of the state's watersheds, the Division of Wildlife Resources launched an aggressive new program—the Watershed Restoration Initiative—to restore critical wildlife habitats in Utah. At virtually the same time, the federal government required states to draft and implement plans, called Wildlife Action Plans, that spell out the threats to wildlife in each state,

and what state wildlife agencies are going to do about it. With these two new programs in place, wildlife across the state will benefit.

But sensitive wildlife species in two habitats already have begun to reap the benefits of these programs. Pygmy rabbits, sage-grouse, mule deer and other wildlife that live in shrubsteppe habitats are already benefiting from restoration programs, while lowland areas with rivers, streams and riparian (streamside)

habitats, which are home to spotted frogs, least chub, Bonneville cutthroat trout and other sensitive species, are also being targeted.

Hatching the plans

In the early part of this decade, it became clear that mule deer populations were in decline, and those declines were driven by declines in the deer's shrubsteppe habitat. With fewer mule deer came fewer opportunities for hunters, which meant less money being spent on hunting equipment and fewer dollars for motels, restaurants and other tourism services. In addition, wildlife diseases such as whirling disease in fishes began to impact other recreational users of wildlife, which also affected the state's tourism industry. All of this had an especially big impact on Utah's small-town and rural economies.

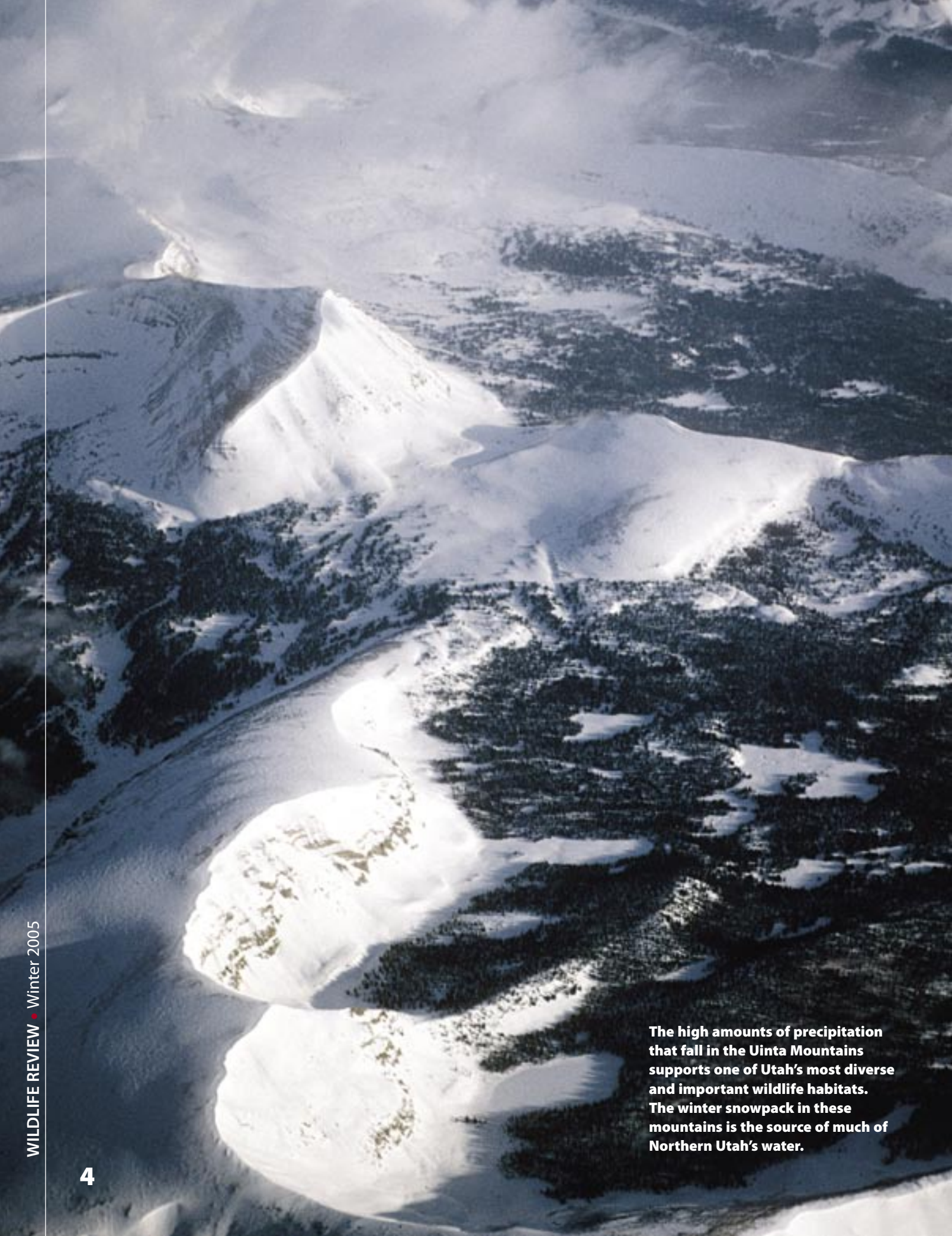
At the same time, concern was building across the state that our watersheds were not as healthy as they once were, which represented a threat not just to wildlife, but also to our way of life in the state. Because wildlife and watersheds are closely linked, the DWR understood that statewide efforts to help protect wildlife where habitats were in decline would also help keep our watersheds healthy.

The DWR launched the Watershed Restoration Initiative to help reverse the ecological and economic downturn, but with its limited staff and budget,



LYNN CHAMBERLAIN

Sensitive species, like the pygmy rabbit, will benefit from new programs.



The high amounts of precipitation that fall in the Uinta Mountains supports one of Utah's most diverse and important wildlife habitats. The winter snowpack in these mountains is the source of much of Northern Utah's water.

the agency couldn't do it on its own.

At about this time (around 2000) a new source of federal funding, called State Wildlife Grants, was made available to state fish and wildlife agencies. The new funding arose from a directive by the U.S. Congress to cooperatively conserve wildlife species and habitats through long-term management that focuses on partnerships.

But to get the funding, states would have to spell out their plans in a strategy. Formerly called the Comprehensive Wildlife Conservation Strategy (CWCS), this effort is now known as the State Wildlife Action Plan. The intent of this effort is to prevent the further federal listing of species as "threatened" or "endangered" under the Endangered Species Act (ESA).

By working collaboratively with private, public, non-profit, corporate and industry sectors, the DWR has outlined a progressive agenda for wildlife conservation in Utah over the next 10 years.

Together, Utah's Watershed Restoration Initiative and the State Wildlife Action Plan will focus conservation efforts on habitats that are essential to many of the sensitive wildlife species in the state. A group that includes both federal and state natural resources agencies, called the Utah Partners for Conservation and Development (UPCD), has spearheaded the effort to restore habitats across Utah. UPCD leaders recognize that by working together they have a greater ability to positively affect shrubsteppe and riparian habitats, two of Utah's 10 most critical landscapes. Through coordinated planning, the UPCD is conducting habitat restoration projects that will enhance these two habitats. That work, in turn, will benefit wildlife and people across the state.

The DWR and its partners also are preparing to help the top 10 habitat types in Utah that support fish and wildlife populations that are most likely to be petitioned for federal ESA listing. The State Wildlife Action Plan identifies six watershed and three rangeland habitats for priority actions. Aspen forests round out the list of the top

habitat priorities.

You can learn more about these habitats by visiting the DWR's Web site at wildlife.utah.gov/cwcs. At the site you'll find documents that provide the location and condition of each of these habitats and a brief synopsis of the problems the habitat and its sensitive wildlife are facing. The documents also describe the potential actions and the possible partnerships needed to restore the habitats.

Cooperative conservation

Another aim of Utah's Wildlife Action Plan is to bring people together to pursue solutions to the problems wildlife are facing in areas both people and wildlife share. Private landowners, who own much of the land in lower-elevation watersheds, are actively seeking out cooperative agreements with governmental and nongovernmental groups to ensure the sustainability of their properties when sensitive species are present. Properly planned developments in these areas will ensure that long-term use by people can occur while sensitive wildlife species are conserved.

The DWR and its partners also want to reach out to organized groups and individual citizens, including landowners, to foster good management of land, air and water through the use of best practices (activities that have been proven to work). These stewardship communities, where people across the state come together to help wildlife and the environment, can become models of landcare and eventually a way of life in Utah.

The DWR is actively supporting these conservation cooperators, and local groups and private landowners are being recruited to the effort. In addition, other groups, such as Envision Utah and the Rich County Coordinated Resource Management Group, are voluntarily stepping up to create and lead new ways to achieve conservation results at local and regional levels.

Two databases help coordinate

The DWR is well on its way to organizing a full tool box of strategies

to help its partners and citizens across Utah implement the State Wildlife Action Plan. Some of these tools can be applied at the regional level to restore shrubsteppe or lowland riparian areas, while others can be directly applied to the enhancement of fish and wildlife populations in need of conservation.

The DWR Habitat Project database is an example of a tool that captures information for the use of landowners and managers in the field. Once a habitat project has been entered in the database, a tracking and monitoring system helps cooperators track the progress toward achieving habitat restoration goals for every project within a region.

The CWCS database is another example of a tool that will store information regarding the habitats and species of greatest conservation need in Utah. The database will allow biologists, land managers and landowners to access data about wildlife populations, including their distribution and abundance. It will also allow them access to information about the landscapes in which this wildlife live, including the location and condition of these landscapes. This tool also provides descriptions of threats to any species or habitat and priorities for their conservation. The CWCS database also will provide a way to retrieve information about possible actions to respond to these problems and partnerships and funding that might be available to deal with them.

Used in tandem, these two databases will provide a powerful set of information that will guide cooperative wildlife conservation into a new era in Utah.

The opportunity is here

The DWR is determined to optimize the return on investment in managing both habitat restoration and sensitive species. With its partners, and a cooperative and engaged citizenry, the agency is poised to launch the most significant undertaking in cooperative conservation Utah has ever seen.

Opportunity is knocking—are you ready? 🐾

BY JOHN FAIRCHILD

Habitat Conservation Coordinator

DEAN MITCHELL

Upland Game Coordinator

JIM PARRISH

Partners in Flight Coordinator

LOSING WESTERN

Wildlife

MUCH OF THE sagebrush in Utah's lower elevations is dead or dying and is only a lightning strike away from being replaced as the dominant habitat on thousands of acres of rangelands.

Old, decadent stands of big sagebrush have been hanging on for years, and wildfires are converting them to less desirable vegetation types at an alarming rate.

In areas where native vegetation is well established among the sagebrush, after a fire the sagebrush will return naturally over time. Where cheatgrass and other weedy species have replaced the native vegetation, however, sagebrush may not return in our lifetime.

The consequences of sagebrush loss will be severe for a variety of wildlife that depend on sagebrush ranges. The impact on wildlife can be better understood by taking a look at three examples: mule deer, sage-grouse and Neotropical birds.

Mule deer

The number of deer throughout most of Utah is limited by the amount of food available to the deer on their winter ranges.

With the exception of some desert areas, summer ranges provide enough food to meet the nutritional requirements of deer, including the requirements deer need to raise fawns. When snow falls early, though, and forces a deer herd to occupy the smaller winter range, food can become scarce in a hurry. A deer's ability to survive through the winter depends on its energy reserves, and that's where habitat plays a pivotal role.


Deer arrive on their winter range with much of the energy they'll need to survive the winter stored as fat on their back. They build this fat up by feeding on nutritious grasses and forbs during the summer and fall. During the winter, when most of the vegetation is covered by snow, deer survive by feeding on exposed shrubs, burning their fat reserves and trying to conserve their energy.



Dying sage

Even under the best conditions, mule deer lose weight during the winter. During severe winters, deer can lose excessive amounts of weight and die. Fawns are the most vulnerable to dying, followed by older bucks and then the does.

Habitat plays several key roles in getting deer through the winter. Deer conserve energy by limiting their daily movements and seeking the shelter of evergreen trees and shrubs, including Utah juniper, pinyon pine, mountain mahogany and tall forms of big sagebrush. Areas with large amounts of this vegetation shelter deer from the wind.



In many areas of Utah, dying sagebrush is giving way to invasive plant species that outcompete native vegetation.

Sagebrush means diminished wildlife

These areas also are warmer than open areas because the plants absorb heat during the day and then radiate the heat back to the ground at night.

But deer need more than cover to survive the winter. Palatable shrubs must be available close to the cover the deer are resting in so they can feed without expending a lot of energy searching for food.

Deer also do better in the winter when they can include a variety of shrubs in their diet. While a diverse shrub community is important to deer, one shrub—big sagebrush—is the staple for mule deer in Utah. With-

out the protein and energy supplied by big sagebrush, the number of deer in Utah would decrease over time and the opportunities to hunt deer would decrease with them.

Changes on winter ranges: Unfortunately, the changes that have been taking place on Utah's winter ranges, and particularly those dominated by sagebrush steppe and pinyon-juniper woodlands, are not benefiting mule deer. In the absence of periodic wildfires, trees have become denser and pinyon-juniper woodlands have expanded, crowding out the vegetation that deer rely on for food.

In other areas, major portions of winter ranges have been lost to catastrophic wildfires. Lacking both cover and food, these large burned areas no longer provide habitat for wintering deer. If cheatgrass and other noxious weeds replace the sagebrush and pinyon-juniper in these areas, they may be lost as deer winter range for generations.

Sage-grouse

Sage-grouse, sage hen and sage chicken are all names used to refer to Utah's largest native grouse, a gallinaceous or "chicken-like" bird that has evolved over millennia in the vast sea of

sagebrush found only in the West.

Found only in western North America and nowhere else in the world, sage-grouse were described by Lewis and Clark in 1805. Various other writings in pioneer journals and historical manuscripts describe sage-grouse in numbers that used to “blacken the sky.”

The first Europeans to describe sage-grouse in the Beehive State were Franciscan missionaries Silvestre Vélez de Escalante and Francisco Atanasio Domínguez and their exploring party, which visited Utah Valley in September 1776. They reported that “wild hens” around Utah Lake were abundant and were used by Native Americans for food.

Since the time of Escalante and Dominguez, sage-grouse numbers have declined to the point that each population of birds in Utah has been petitioned for listing as threatened or endangered under the federal Endangered Species Act (ESA).

Listing sage-grouse under the ESA would affect people across the state. For example, a range of both public and private land uses, from recreational activities to mining or grazing operations, could be restricted or eliminated; viewing and hunting opportunities could be lost; and the influence state and local groups have on sage-grouse conservation could be limited.

A Utah native in decline: Sage-grouse, unlike other gallinaceous upland game birds such as turkeys and pheasants, lack a well-developed muscular gizzard to process food. Because of this, sage-grouse need soft foods, such as the leaves of sagebrush, to survive. During the winter, the sage-grouse’s diet consists almost entirely of the pungent and pliable leaves of sagebrush. Without sagebrush, there are no sage-grouse.

Utah’s two sage-grouse species occupy sagebrush habitats ranging from 4,000 to 9,000 feet in elevation in the

Colorado Plateau and Great Basin geographic regions. The greater sage-grouse lives north and west of the Colorado River, while the Gunnison sage-grouse is found south and east of the Colorado River, mostly in San Juan County.

Based on historical accounts and observations, it’s likely that sage-grouse were originally found in portions of all of Utah’s 29 counties where there was enough sagebrush habitat to support the birds. Today, sage-grouse are no longer found in Davis, Salt Lake and Washing-

which males congregate on areas known as strutting grounds, or leks. A dominant male bird, called the “master cock,” breeds most of the females that are attracted to the lek.

It’s during this time of year that sage-grouse are most easily enjoyed by people wishing to catch sight of them.

Sage-grouse are hunted only in those areas of Utah where there is a minimum breeding population of at least 500 birds. Those areas include western Box Elder County and all of

Rich County; Blue and Diamond mountains in northeastern Utah; and Parker Mountain in south-central Utah. A harvest management strategy adopted in 2002 allows for a harvest of no more than 10 percent of the estimated fall population in any area open to hunting.

“ENSURING SAGE-GROUSE REMAIN ON UTAH’S LANDSCAPES WILL MAINTAIN A PART OF OUR HISTORY, AN ICON OF THE WEST, A PART OF OUR HERITAGE THAT MAKES THE WEST THE WEST.”

ton counties.

Research suggests that sage-grouse were historically found throughout about 33 percent of Utah’s landscape. Today, only about 14 percent of Utah’s landscape is inhabited by sage-grouse.

The current distribution of sage-grouse represents just 41 percent of the historical distribution of sage-grouse in Utah. The greater sage-grouse currently occupies 41 percent and the Gunnison sage-grouse 27 percent of their potential historical distribution. The estimated breeding population of sage-grouse in Utah is 13,000 to 15,000 birds.

Outright loss, degradation and fragmentation of sagebrush habitats are suspected as the primary causes for sage-grouse population declines throughout Utah. Research in the Strawberry Valley area of Wasatch County also suggests that predation by nonnative red foxes is limiting sage-grouse population growth in that area.

Viewing and hunting sage-grouse:

Annually, sage-grouse exhibit a spectacular spring breeding display during

Canaries in a coal mine: Ensuring sage-grouse remain on Utah’s landscapes will maintain a part of our history, an icon of the West, a part of our heritage that makes the West the West. Sage-grouse are like “a canary in a coal mine.” Their disappearance has awakened us to changes in our sagebrush ecosystems.

Aldo Leopold, considered the father of wildlife management, wrote, “Conservation means harmony between men and land. When land does well for its owner, and the owner does well by his land; when both end up better by reason of the partnership, we have conservation. When one or the other grows poorer, we do not.”

Ensuring that there are sage-grouse in Utah in the future is the epitome of conservation.

Neotropical birds

Each year, Utah hosts tens of thousands, even millions of visitors from far-away lands. Some are enroute to other places, but for many Utah is their destination. Year in, year out they keep com-

Sage-grouse inhabit only a fraction of their historic range in Utah. Loss and degradation of sagebrush is likely the primary cause of this decline. Without sagebrush, there will be no sage-grouse.





ing, primarily because of our landscape.

While many thousands of people visit Utah each year, birds—particularly those species known as neotropical migratory birds, or “neotrops”—also visit the state in droves. Like their human counterparts, these birds annually come to Utah by the tens of thousands. Unlike their human counterparts, however, these neotrops select Utah for a very specific reason: to raise a family.

Long-distance traveling: The term “migratory birds” is typically used to refer to those species of birds that leave their North American breeding grounds following the breeding season to spend the winter in either Central or South America. When the term “migratory

birds” is brought up, most people think of waterfowl, such as ducks, geese and swans. Large flocks of those species are certainly among the most visible in the fall skies, when the leaves start to turn color in Utah and there’s a little chill in the air. Likewise, the return of these species in the spring heralds the end of winter and the rebirth of the landscape.

Waterfowl aren’t the only birds that make a long migration, however. About 80 percent of Utah’s non-waterfowl bird species also migrate to southern climates during the winter and then return to Utah again in the spring to breed. In fact, some of Utah’s neotrops cross the equator twice each year, once when they leave in the fall and again as they return in the spring. These birds stop and feed along

the way to replenish fat reserves that are used for energy during migration. Some birds can make it as far as northern Mexico on their one to two grams of fat reserves without “refueling.” That’s the equivalent of getting 1.4 million miles per gallon of fuel.

Tied together in decline: Shrublands are a dominant part of Utah’s landscape. Shrubsteppe habitat (sagebrush country) in particular is the third-most-common habitat type in Utah, comprising more than 7 million acres of the landscape statewide. Sagebrush country symbolizes the West, and a variety of wildlife species have adapted to living in this semi-desert environment.

Some of Utah’s migratory bird spe-



Often ignored, the West's vast areas of shrublands dominate Utah's landscape, and are critical habitat for many species of wildlife.

cies have been referred to as "sagebrush obligates," meaning that they depend almost entirely on sagebrush for their existence. Birds in this category include the sage thrasher, sage sparrow and Brewer's sparrow.

In recent years, drought conditions in Utah have damaged several million acres of shrubland habitat, with sagebrush communities being the hardest hit. Shrubsteppe birds that once nested in these areas will now be forced to seek out other places to breed.

In addition, large tracts of shrublands have been invaded by cheatgrass. As a result, they no longer attract migratory birds for breeding.

Additional threats to shrubsteppe and other shrubland habitats also exist statewide, including improper livestock grazing, improper off-highway vehicle use, oil and gas development, urban expansion and real estate development, and wildfires. Even though seven million acres sounds like a lot, when all of these pressures and related activities are added up, all too often little is left for the birds and other wildlife that are trying to exist in these areas.

Over the last 30 years, shrubland birds have shown some of the most consistent population declines of any



FRANK HOWE

Several neotropical birds, like this sage sparrow, depend on the West's delicate shrubsteppe habitat.

group of bird species. The populations of 63 percent of shrubland-dependent bird species are declining, and in the Intermountain West more than 50 percent show downward trends. In Utah, Brewer's sparrow and sage sparrow are among the bird species that have been identified as priority species for conservation action.

Imagine a world without birds: The reason for declines in bird populations are often complex and sometimes poorly understood. A cooperative approach involving state and federal agencies and private landowners is underway and will be critical to effectively addressing pressures on shrubsteppe habitat and the birds that live there. Focused, cooperative, and voluntary habitat conservation is the key to bird conservation. Focusing on habitat will improve conditions for all birds, whether migratory or resident, endangered or common, game or non-game, and will contribute to the protection of other forms of wildlife, plants and ecological communities.

An abundance of wild birds contributes to the health of the ecosystem and provides economic, recreational, scientific and aesthetic values for people. Declines in shrubsteppe birds reflect a decline in healthy shrubsteppe habitat. Community growth that fails to consider impacts to shrubsteppe habitat will ultimately yield a reduced quality of life, and quality of life is what the West is all about. 🐦

Threatening our homes, stealing our rangelands

Cheatgrass

BY JOHN FAIRCHILD

Habitat Conservation Coordinator

impact on the state is alarming.

Fueling the fires

Few invasive weeds have affected semi-desert plant communities in the Intermountain West more than cheatgrass.

In these areas, moisture in the soil is at a premium, and cheatgrass, with its long history of adaptation to similar sites in the Mediterranean Region, easily out-competes native plants for moisture and nutrients. The seeds of cheatgrass

germinate and the plant establishes itself in the fall and winter. As a winter annual, it robs moisture and nutrients from the soil when native grasses and forbs are still dormant.

This early activity by cheatgrass has a two-fold effect: it limits the growth of the native perennials and prevents the establishment of their seedlings. Cheatgrass reaches maturity and sets seed four to six weeks before the native perennial grasses. By June, cheatgrass has cured and is ready to burn with the first lightning strikes of the year.

And the presence of dried fuel early in the year is only part of the problem. The change that a cheatgrass invasion brings to a plant community is what distinguishes the type of fires we're seeing today from those as recent as only 20 years ago.

Historically, Utah's rangelands were dominated by perennial bunchgrasses. As the name implies, bunchgrasses grow as individual plants in "bunches." Sites dominated by bunchgrasses have more open space between plants, and the plants stay green longer into the growing season. When a fire starts in an area dominated by bunchgrasses, there is a greater chance that it will die out because of the sparse vegetation. Typically, fewer acres are burned and the post-burn landscape is generally a mosaic of burned and unburned areas.

Fires are very different in areas



YOU PROBABLY saw the scene on more than one news broadcast in Utah this past year. With flames burning within sight of homes in the background and air tankers dropping fire retardant out of the sky, the reporter stoops down and points to the culprit behind the rangeland fire you're witnessing: a highly flammable, non-native grass called cheatgrass.

Cheatgrass

Also known also as "junegrass" and "downy brome," cheatgrass escaped from its native Mediterranean rangelands in the late 1800s and found its way to the Columbia River Basin in contaminated grain seed. By 1920, it was well established. It's been increasing throughout Utah and the Intermountain Region ever since.

Cheatgrass deserves the "culprit" status reporters often give it, but because of time constraints, reporters can't tell you the whole story on the six o'clock news. But it's a story worth telling because its



Unlike the bunch grasses native to Utah, cheatgrass grows as a continuous and highly flammable ground cover. Areas colonized by cheatgrass burn more frequently—making it difficult for native plants to re-establish after fires.



In some areas, periodic fires are necessary to prevent pinyon-juniper forests from dominating the landscape.

invaded by cheatgrass. Cheatgrass fills the spaces between the bunchgrasses, creating a continuous cover of highly flammable fuels. What was once a sparsely vegetated, fire-resistant area, is now a dense, dry tinderbox. When ignited, wildfires spread through cheatgrass-dominated landscapes quickly and completely, consuming a much larger area.

The cheatgrass invasion has done more than just increase the acreage burned annually in the West. It has also dramatically changed the fire frequency. In native shrub-bunchgrass ranges, fires occurred every 30 to 75 years. In cheatgrass ranges, fires occur every 10 years or less. In fact, cycles as short as every four years are common in cheatgrass-infested areas.

The increase in fire frequency has eliminated most shrubs and reduced the density of native bunchgrasses and forbs. As a result, the native plant communities that support Utah's wildlife are being wiped out at an alarming rate.

As damaging as the cheatgrass invasion has been, though, it's not the

only "culprit" cheating us out of healthy rangelands.

The legacy of fire suppression

As damaging as frequent fires can be to native plant communities, the complete absence of fire can have similar consequences. Without periodic fires, sagebrush and pinyon-juniper can completely dominate landscapes.

Well intentioned fire suppression efforts by state and federal land management agencies over the last 50 years have changed our rangelands. Without periodic, lower-intensity fires, pinyon-juniper stands have grown so dense that they have shaded out the native grasses and forbs that once shared the areas and spread into—and often overtaken—adjacent sagebrush ranges. Fires burn much more intensely in these dense forests, and without seed reserves of native grasses and forbs in the soil, expansive areas are exposed to invasion by cheatgrass and other noxious weeds after a wildfire.

Once the conversion is made to cheatgrass, the natural process to reestablish the former native plant communities

can take decades, if it takes place at all. These areas provide limited value to the remaining wildlife and are guaranteed to burn more often.

High-risk homes

If catastrophic wildfires burning up livestock grazing land and wildlife habitat aren't enough to get our attention, then perhaps the possibility of entire subdivisions going up in smoke will.

Western range fires have been increasing in intensity for years, but because more homes are bordering our rangelands now, we're starting to take notice. When homes are in the path of a major wildfire, the response to put those fires out is more aggressive, more costly and more hazardous than it once was.

Although it's a problem that's been growing for years, wildlife managers, landowners, homeowners and others are just beginning to understand the costs and complexity of the changes that are taking place on Utah's rangelands. With every fire season, those costs grow, which is why you'll probably be seeing plenty of cheatgrass on the evening news this coming summer. 🐾

By ANIS AOUDE

Central Region Wildlife Manager

DL&L

Deseret Land & Livestock: Where the deer, the antelope and the livestock play

NESTLED IN northern Utah is one of the nation's best examples of a profitable livestock ranch that also provides tremendous benefits for the wildlife within its borders.

Located southwest of Woodruff, Deseret Land and Livestock (DL&L) encompasses more than 200,000 acres of private land. The ranch is part of a taxpaying corporation owned by The Church of Jesus Christ of Latter-day Saints.

An incredible mix of habitats, ranging from low-altitude sagebrush to high-elevation aspen and conifer trees, are found within DL&L. This variety of habitats allows a diversity of wildlife to coexist with livestock on the ranch. The ranch's resources are managed using a holistic approach that focuses on the entire ecosystem. And it's an approach that's working: about 2,500 elk, 3,500 deer, 150 moose, 700 pronghorn antelope, 2,000 sage grouse and more than 260 species of birds co-exist with more

than 5,000 cattle and 3,000 sheep at the ranch.

Using grazing as a management tool

DL&L's approach to grazing is high intensity and short duration. The goal of the system is to balance the amount of grazing that takes place at the ranch with

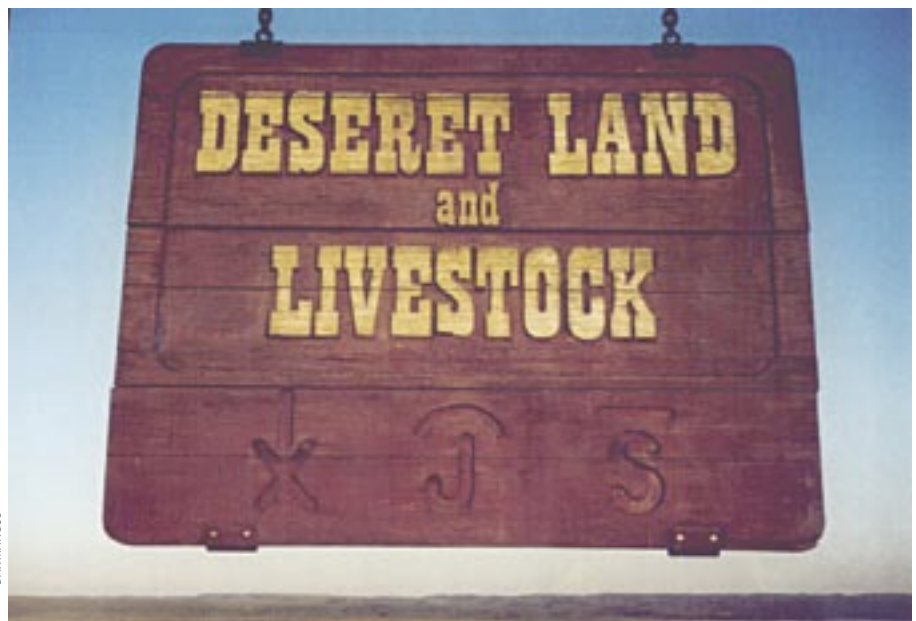
the amount of time areas that have been grazed are given to rest. Herds of bison utilize their landscapes in much the same way, so DL&L's approach mimics some natural grazing systems.

Managers use fencing and herding to control when and for how long cattle graze. During periods of the year when plants grow quickly, cattle are grazed in large herds and are moved from pasture to pasture quickly. On any given day during this time, only 10 percent of the ranch's vegetation is exposed to grazing. The other 90 percent is allowed to rest and recover.

There are times when elk herds can overgraze areas along rivers and streams (known as riparian areas). This usually happens at DL&L in mid to late summer. When elk overgraze a riparian area, it's just as destructive as when cattle overgraze the area.

DL&L managers found a solution to this problem during a research project focused on the effect of grazing on deer and elk. Researchers found that elk did not stay in an area if sheep were grazing in it. The elk usually returned to the area about two weeks after the sheep were gone.

DL&L managers now use sheep to move elk out of canyons where riparian vegetation is stressed. The sheep are allowed into the riparian area only long enough to drink. This approach allows the riparian vegetation two weeks to rest



DAX MANGUS



A diversity of habitats, ranging from sagebrush to aspen and conifers, are found at DL&L. This variety helps enable wildlife to comfortably coexist with livestock on the ranch.

PHOTOS BY ANIS ADUDE & DAX MANOUS

and regrow. After the rest, these plants are usually more nutritious. When elk return to these areas, they utilize the nutritious forage to get themselves in condition for the breeding season.

Enhancing the rangeland

DL&L enhances its rangeland, where sagebrush has become old and decadent, by treating 1 to 2 percent of it annually. The treatments, which include burning, thinning and seeding, are designed to rejuvenate new sagebrush and other plants that animals eat. Because sagebrush is an important forage and cover plant for wildlife, these treatments are usually done in a mosaic that leaves islands of older sagebrush behind.

Wildlife use the islands of older sagebrush until new plants establish themselves in other areas. Because plant communities are always changing, however, these areas will require treatment again in 10 to 20 years.

Managing for all kinds of wildlife

DL&L has an active wildlife management program that emphasizes biodiversity (a diverse mix of wildlife).

More than 260 species of birds call DL&L home during their breeding season. Managers monitor these species by conducting three breeding bird surveys annually. Sage-grouse are among the birds at the ranch. Although sage grouse have declined across Utah, the ranch's sage-grouse population is stable at about 2,000 birds. DL&L managers currently survey 16 active leks (breeding grounds) annually.

DL&L is also one of Utah's Cooperative Wildlife Management Units (CWMU). The CWMU program provides private landowners with financial incentives to manage their lands for wildlife. The program also gives public hunters who obtain a permit through Utah's big game draw an opportunity to hunt these private lands. In return, the landowner receives permits they can market. DL&L is a CWMU for deer, elk, moose and pronghorn antelope. All antlerless permits for deer and elk on the CWMU go to public hunters.

DL&L also has a fisheries resource that is actively managed. Several ponds on the ranch are stocked with various trout species. The larger streams on the

ranch are managed for a native cutthroat trout fishery. There is no public fishing access, but an outfitter does provide guided fly fishing trips on the ranch.

Visiting the ranch

Because of the intensive management that takes place at DL&L, recreational activities on the ranch are limited. The following opportunities are available to the public:

- ♦ Hunting is available to those who draw or purchase a buck, bull or antlerless CWMU big game permit for the ranch.

- ♦ Fishing is available through an outfitter service that leases the fishing rights from the ranch.

- ♦ Bird watching also is offered through an outfitting service, and people come from around the country to view birds at DL&L.

- ♦ Pioneer treks also are offered for those who wish to reenact the Mormon pioneers' journey to Utah.

To learn more about these opportunities, visit the DL&L Web site at www.deseretlandandlivestock.com. 🐾



Deseret Land and Livestock property is open for limited public birdwatching, hunting and fishing opportunities.

By JOHN FAIRCHILD
Habitat Conservation Coordinator

Utah Partners for Conservation and Development

Rangelands

UTAH'S SAGEBRUSH rangelands will become highly productive and diverse habitats for wildlife, healthier watersheds for people and improved lands for grazing if a group representing state and federal land management agencies and private grazing land managers has its way.

Representatives of the Utah Partners for Conservation and Development (UPCD) have agreed to make managing and restoring these rangelands a top priority for their agencies and groups. They've also agreed to share resources in an unprecedented initiative to conserve sagebrush ecosystems statewide. The conservation initiative they've agreed to targets decadent sagebrush and encroaching pinyon-juniper woodlands in focus areas that have been selected for their wildlife value. Special emphasis is being placed on crucial sage-grouse and mule deer habitats.

These agencies and organizations have a long history of coordinating rangeland restoration projects in Utah,

but the dynamic changes that have occurred on these rangelands over the last 50 years have required them to take a new approach together.

In 2005, the first year of the conservation initiative, the UPCD partners committed more than \$8 million to restore more than 120,000 acres of public and private land in 22 counties: The Utah Legislature kicked things off with a \$2 million contribution in support of the state's ongoing watershed conservation program. The Bureau of Land Management has taken the lead on public lands by allocating more than \$3.5 million to range restoration, mostly through their fuel-load reduction program. The Natural Resources Conservation Service has taken the lead on private lands by making \$1.5 million in matching funds available to landowners through various Farm Bill programs.

It's collaborative conservation on a grand scale, and each participant is finding out that help can come from unlikely sources because everyone is focused on the same goal: creating and maintaining healthy rangelands in Utah.

The problem

The threat of sagebrush rangelands in Utah being converted to less desirable rangelands has been the topic of numerous articles in newspapers and previous editions of the *Wildlife Review*. The issues faced by sagebrush rangelands (known as shrubsteppe) can be summarized as follows:

- Cheatgrass, a non-native annual grass, has moved into most of the sagebrush stands in Utah. This has increased the risk of catastrophic wildfires greatly.
- The ability native plants have to grow and flourish is severely limited in stands dominated by cheatgrass.
- In the absence of natural wildfires, woody plants such as sagebrush, pinyon pine and Utah juniper have increased in density, greatly increasing the risk of catastrophic wildfires. Since the seed reserves of native plants are lost from the soil over time, in many areas natural revegetation following wildfires is no longer possible.
- Noxious weeds and invasive annual grasses are pervasive on many shrubsteppe ranges, setting the stage for an unalterable increase in how often fires burn and the subsequent loss of productive wildlife habitat because of the increased fire frequency.
- Watersheds invaded by noxious



PHOTOS BY BRENT STETTLER



Left, Guy Wallace collects sagebrush seed. Above, a healthy rangeland consists of a variety of grasses, forbs, brush and trees. Right, airplanes are often an efficient means to seed large areas of rugged rangeland.



weeds and dense pinyon-juniper woodlands lack the green and leafy plant cover needed to protect the soil and its ability to trap, store and slowly release water to springs, streams, lakes and reservoirs. Healthy rangelands are essential in reducing the amount of sediment and other pollutants that end up in the state's water supply.

How to fix it

The UPCD's approach to the problem focuses on a well-planned, long-term restoration and management program to prevent the large-scale conversion of diverse, productive rangelands to non-desirable plants or closed stands of pinyon-juniper woodlands.

Teams have been organized in each of the Division of Wildlife Resource's five regions to implement the program.

Each team includes regional UPCD representatives and representatives of a variety of conservation interests. Each team has defined focus areas for their region and habitat restoration objectives for each of these areas. Project proposals are reviewed at regional team meetings and are entered into a statewide habitat project database. This approach helps the partners share information and resources, and many of the projects receive funding from several partners.

Methods being used

This past fall, UPCD partners completed projects in focus areas across the state. They used a variety of methods to increase the diversity of beneficial grasses,

forbs and shrubs. Their projects fell into two main categories: fire rehabilitation and mechanical treatments.

Fire rehabilitation projects involve artificial seeding following a wildfire or a burn that was done intentionally to help the area (called a prescribed burn).

In rugged terrain, the seed is usually dropped from a specially equipped airplane or helicopter. When possible, after the seed is dropped an anchor chain is dragged over the burned area by two tractors to cover the seed with soil. On flat terrain, rangeland drills are often used to place seed into furrows (much like a grain drill is used on a farm). The furrows concentrate the moisture in the soil and increase the chance the seed will establish

itself and grow.

The typical mechanical treatment project involves attaching an implement to a tractor and dragging it through dense stands of sagebrush, or through pinyon-juniper woodlands that have spread into sagebrush sites. This treatment is coupled with a seeding operation.

The Lawson pasture aerator, Dixie harrow and anchor chain were used on this fall's projects to thin sagebrush and prepare the type of seedbed needed for the seed to establish itself. The pinyon-juniper treatments involve removing individual young trees (usually with sawyer crews) that have spread into productive sagebrush sites or using an anchor chain to open up larger areas within a partially closed stand where patches of sagebrush are still present.

The oldest pinyon-juniper stands are so dense that the trees block out much of the light to the soil below, leaving the ground bare. While these stands lack the potential to support a more diverse and productive plant community, they do provide important breeding habitat for several species of neotropical migratory birds. They also provide critical cover for mule deer and other wildlife in the winter. Without restoration work in adjacent, more productive sites, old-growth stands are at risk of being lost to catastrophic wildfires.

BLM fuel management specialists are working to stem the tide of recent catastrophic wildfires in the West by limiting fuels for fires. They're targeting their efforts in UPCD focus areas and selecting

treatment methods that also benefit wildlife to meet both fire management and wildlife habitat management objectives.

Evaluating and adjusting

Even though the conservation initiative is guided by the best science available and by capable natural resource professionals, a well-coordinated monitoring program is essential to evaluate the treatment methods and make the adjustments needed to meet the partnership's goals. The Division of Wildlife Resource's Range Trend Study Project will monitor how vegetation responds to the treatments. The true test, however, will be

the response of sagebrush-dependent wildlife. DWR biologists will conduct surveys to monitor the response of sensitive species, such as greater and Gunnison sage-grouse, pygmy rabbits and several neotropical migratory bird species. Biologists also will track how deer herds respond to the restoration work on winter ranges.

There's a lot of work to be done to ensure a future of healthy rangelands. But, by approaching old problems in new and creative ways, the unique blend of agencies and groups that have come together under the UPCD is leading the way. 🐾



PHOTO BY CORY MANLETT



PHOTO BY RON STEWART

PHOTO BY PHIL DOUGLASS

**Mechanical treatment and reseed-
ing of rangelands often involves the use of
heavy equipment to clear, cultivate and
seed areas being treated. The results
of these efforts are healthy, diverse
habitats that are capable of sustaining
wildlife and resisting colonization by
invasive plant species.**



BY JILL WEST
Coordinator of Volunteers

Dedicated Hunters

IT'S CHILLY and shorebirds can be heard scuffling in the distance as volunteers from the Dedicated Hunter program gather around David Lee on the edge of the Utah Lake Wetland Preserve.

They soon learn their task for the day: drive the fence line around the perimeter of the preserve and look for and repair weak spots in the fence. Lee, Central Utah Project leader and habitat biologist for the Division of Wildlife Resources, thanks

the volunteers for coming and explains how important it is to keep livestock out of the preserve. The fences are the first line of defense against a wayward cow.

Volunteers mount their off-highway vehicles and set out in groups, ready to tackle the project and happy to be part of a team that's creating a new place for wildlife in Utah's Great Basin landscape.

Reclaiming a place for wildlife

In an area traditionally used for agriculture, the Utah Lake Preserve

is new, created by the authority of the Bureau of Reclamation as part of the Central Utah Project (CUP).

"Nobody gets a chance to build a refuge anymore," Lee says, emphasizing that the preserve is a unique site and a special opportunity for volunteers. Much of the work needed to improve wildlife habitat in the area involves erasing the impacts that humans and livestock have made on the property over the last century or so.

The CUP is a coordinated effort to manage Utah's water resources in a

way that provides water for agricultural, industrial and municipal use along the Wasatch Front. The Bureau of Reclamation has set aside funds to purchase two units of land around Utah Lake: Goshen Bay and Benjamin Slough. Both are at the southern end of Utah Lake and include creeks and wetlands that drain into the lake.

The section of the CUP that falls within the two districts of the Utah Lake Wetland Preserve will be preserved in part to mitigate, or compensate, for the development of wetlands in more populated areas of Utah County. Much of the area within the preserve is being converted from grazing land into wetlands. Slowing or eliminating agricultural runoff and restoring the proper distribution and circulation of water are the first steps in restoring the area's ecological function and recreating high-quality wildlife habitat.

If all of the privately held land within the two units of the preserve is successfully purchased by the state, the Utah Lake Wetland Preserve will grow to 25,000 acres in size. The creation of the preserve is a small part of the CUP, but its location makes it a critical piece of wetland habitat in Utah's dry Great Basin region.

Utah Lake is the largest natural freshwater body in the western United States. The lake and its surrounding wetlands are important habitat for numerous bird species that migrate through Utah each year. The wetlands surrounding



Dedicated hunters contribute many hours to important fencing projects.



A dedicated hunter helps clear tamarisk from Utah Lake Wetland Preserve.

Utah Lake are also home to many mammal, amphibian, reptile and fish species.

Improving habitat across Utah

Lee says the perimeter of the Utah Lake Wetland Preserve is large enough that it can't be maintained without the help of volunteers. "Dedicated hunters are a huge part of what we do," he says.

Over the last two years, dedicated hunters have built and maintained fences to keep animals from surrounding ranch properties out of the preserve, which is critical for preserving the preserve's wetland habitat.

But they've done much more.

Dedicated hunters also have im-

proved access to the site by donating heavy equipment to grade and maintain roads. They've improved habitat at the preserve by removing invasive species, such as tamarisk and Russian olive trees. And they've improved an existing structure at the preserve that will serve as a workshop and have donated many of the tools found in the shop.

The creation of the Utah Lake Wetland Preserve wouldn't have been possible without DWR volunteers. Lee spends a great deal of time working with small groups of volunteers and explaining to them how valuable their work is to wildlife conservation. He always makes sure they know they're making a difference.

"If you treat people right, they come back over and over again," Lee says. "They want to finish the job they started, even if it takes longer than the service hours they need for their Dedicated Hunter permit."

Helping create a wetlands preserve is just one of many significant contributions dedicated hunters have made to improving Utah's wildlife habitats during the past year.

Thousands of acres of pinyon-juniper woodlands have been cut with hunter-owned chainsaws to make way for valuable sagebrush steppe habitat.

Fencing projects continue to occupy the days of many dedicated hunters. Because livestock can quickly degrade high-quality wildlife habitat, keeping the DWR's wildlife management areas safely fenced is important in maintaining the size and quality of many of the state's big game herds.

In many areas of the state, removal of invasive plant species and the improvement of river and streamside corridors have benefited both hunters and anglers by creating valuable habitat for animals, such as deer and elk, as well as for trout.

Participants in the Dedicated Hunter program work on habitat and other projects year-round. If you're a dedicated hunter, don't wait until the last minute to complete your service hours. Visit wildlife.utah.gov/dh/projects.html during the winter and spring to work on a wildlife conservation project at the Utah Lake Wetland Preserve or another location in Utah as soon as you can. 🐾

Volunteer notes

Dedicated Hunters


- Return unused 2005 Dedicated Hunter permits by Jan. 31, 2006 to avoid being credited with a program harvest. Bring permits to any DWR regional office or mail them to: Utah Division of Wildlife Resources, ATTN: Dedicated Hunter Program, P.O. Box 146301, Salt Lake City, UT 84114-6301.

- If you signed up for the Dedicated Hunter program in 2003 and wish to renew your membership in the program, please visit the DWR Web site at wildlife.utah.gov/dh in January to complete the application steps to re-enroll.

A new COR will be issued, and you will need to complete the first-year requirements in 2006. Please check the Dedicated Hunter Rule at the first of the year for any changes to the program or its requirements. The rule, R657-38, can be viewed at wildlife.utah.gov/rules.

Volunteers wanted

- You don't have to be a dedicated hunter to volunteer. The DWR has volunteer opportunities for anyone interested in giving educational presentations, explaining hunting and fishing regulations or leading tours at wildlife management areas. If you're interested in working with Utah's wildlife resources, send an e-mail to DWRvolunteer@utah.gov to request more information about opportunities in your area.



Clean water is critical to healthy ecosystems. Without healthy water, a healthy ecosystem is impossible. In a dry state like Utah, the relative scarcity of water makes water especially important and vulnerable.

Connecting
all the pieces
in the puzzle

Ecosystems

By DIANA VOS

Project WILD Coordinator

WHEN YOU walk outside in the morning, you expect to breathe clean air. You'd think it odd if you couldn't find fresh fruits and vegetables in the grocery store. And when you turn the tap on in your kitchen, you expect your glass will fill with water that's safe to drink.

The air we breathe, the food we eat and the water we drink comes to us courtesy of nature's ecosystems.

Just to review, an ecosystem is a community of plants and animals interacting with one another and with their physical environment. Ecosystems also include the soil, water and nutrients that support the organisms that live within the ecosystem. These organisms range from large animals and plants to microscopic bacteria.

Ecosystem services

In her 1997 publication, *Nature Services: Societal Dependence on Natural Ecosystems*, Gretchen Daily defined the

"services" provided by ecosystems as "the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life" by producing, directly or indirectly, goods and life-support services that benefit people.

Examples of the services ecosystems provide include: (1) clean air; (2) water purification and storage; (3) livable climates; (4) pollination of crops and other

vegetation; (5) soil generation and preservation of its fertility; (6) control of agricultural pests and disease-carrying organisms; (7) genetic resources and maintenance of biodiversity; (8) mitigation of drought and floods; (9) erosion control; (10) cycling of nutrients, such as nitrogen and carbon; (11) detoxification and decomposition of wastes; and (12) cultural, spiritual and intellectual experiences.

Unfortunately, the ecosystems that have provided the services essential to sustain humanity since the beginning of time are becoming more and more compromised every day. Even though they're fundamental to life as we know it, people often take ecosystem services for granted until their disruption or loss highlights their importance. It then becomes clear how costly and how hard, or in some cases impossible, it is to replace these services with human-engineered alternatives.

Ecosystems worldwide are suffering, most likely because people don't realize how valuable ecosystems are to them. Also, there are practically no social and economic mechanisms to encourage people to invest in maintaining them.

Unless people start to consider the true impacts of their actions on



Ecosystems are characterized by the interactions between communities of plants, animals and the environments in which they live.



Healthy ecosystems are able to support a healthy diversity of wildlife.

ecosystems, and make wiser choices to better maintain and restore the health of ecosystems, the services nature provides us will be impaired or destroyed.

Placing precise monetary values on various ecosystem services is difficult, but in some cases the estimates of the costs involved have been calculated. The following are some examples from the Ecological Society of America:

- ♦ Much of the Mississippi River Valley's natural flood-protection services were destroyed when wetlands adjacent to the valley were drained and channels were altered. As a result, floods in 1993 resulted in property damages estimated at \$12 billion. Part of the reason for the staggering figure is the inability of the valley's depleted ecosystem to lessen the impacts of the high volumes of water.

- ♦ Before it was overwhelmed by agricultural and sewage runoff, the watershed of the Catskill Mountains provided New York City with water ranked among the best in the nation. When the water fell below quality standards, the city investigated what it would cost to install an artificial filtration plant. The estimated price for a new facility was \$6 billion to \$8 billion, plus an annual operating cost of \$300 million. That's a high price to pay for clean water that was once free. New York City decided to invest a fraction of that cost, \$660 million, to restore the natural capital it had in the Catskill's watershed.

- ♦ More than 100,000 animal species, including bats, bees, flies, moths, beetles, birds and butterflies, provide free pollination services. One third of human food comes from plants pollinated by wild pollinators. Pollinators play a key role in the production of more than 150 food crops. In the United States alone, the value of pollination services from wild pollinators is estimated at \$4 billion to \$6 billion a year.

♦ Eighty percent of the world's population relies on natural medicinal products. Of the top 150 prescription drugs in the United States, 118 originate from natural sources. Seventy four percent of these 118 drugs originate from plants, 18 percent from fungi, five percent from bacteria and three percent from a snake. Nine of the top 10 drugs in the U.S. originate from natural plant products.

Clean water

In Utah, the nation's second-driest state, water purification is an especially important ecosystem service.

Wetlands, forests and riparian (streamside) zones provide clean drinking water and water suitable for industrial uses, recreation and wildlife habitat. As water moves through these ecosystems, pollutants such as metals, viruses,

"Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principal measure of how we live on the land."

— LUNA LEOPOLD —

oils, excess nutrients and sediment are filtered out and absorbed by soil particles and living organisms. Microorganisms (bacteria and other microbes), the natural chemical engineers of ecosystems, utilize or break down nutrients, metals and other chemical contaminants in the water as it passes through the soil. These ecosystems cleanse many types of pollutants for us:

♦ Nitrogen and phosphorus, nutrients essential for life, can become serious

pollutants when they occur in excessive amounts. Excess nitrogen and phosphorus enter waterways from sources such as manure, fertilizers and septic tanks. They can cause blooms of algae that decrease oxygen levels in water, resulting in the death of fish and other serious problems. Ecosystems remove nutrients through direct uptake by plants, algae, bacteria, insects and fish, or by absorbing nutrients into the

soil. Incredibly, riparian areas reduce the nitrogen concentration in water runoff and floodwater by up to 90 percent and can reduce phosphorous by as much as 50 percent.

♦ Certain pesticides and herbicides can kill aquatic organisms and cause developmental abnormalities and disease in animals and people. These pollutants often enter rivers through runoff from roads, agricultural areas and golf courses. Pesticides and herbicides are very expen-



Winter snowfall in the mountains creates a reservoir of fresh water that flows to lower elevations throughout the year.

UTAH'S WILD NOTEBOOK



© KIRK GARDNER

Even the driest parts of Utah support healthy communities of plants and animals adapted to those environments.

sive to remove if they enter the drinking water supply. In natural ecosystems, many bacteria make a living degrading organic chemicals and many are important in breaking down pesticides and herbicides.

- ♦ Heavy metals such as mercury enter aquatic systems from a variety of sources. They can disrupt aquatic systems, harming aquatic organisms and making water unsafe to drink. Fish in affected waters also can become unsafe to eat. Wetlands process and remove 20 to 60 percent of these run-off metals when they enter the system in runoff.

- ♦ Excessive sedimentation occurs as soil is eroded and washed into waterways or blown in from exposed earth. Construction, road building, logging and agricultural activities can cause this to occur. Large amounts of sediment can reduce a waterway's ability to control floods by exhausting its capacity to store extra sediments that come with flooding. Excess sedimentation also clouds streams, harming fish and underwater vegetation. Other pollutants, such as fertilizers and pesticides, also can be washed into waterways with sediments. Wetlands, however, can trap 80 to 90 percent of sediments that come through runoff.

Keeping ecosystems healthy is the key

to maintaining the water purification and other natural services ecosystems provide. We may not be able to survive without these services.

YOU MAY BORROW the following educational trunks from Project WILD to use with your students: *Understanding the Work of Nature*, *Appreciating Nature's Services*, and *Conserving the Diversity of Life*. Each trunk contains an easy-to-follow activity guide with instructions and background information plus maps, posters, videos, and CD-ROMs and other supplemental materials. Because of their large size, these trunks cannot be shipped. To reserve a trunk, call Diana Vos at (801) 538-4719.

Getting WILD! Utah's WILD Notebook is produced by Utah's Project WILD program. WILD workshops, offered by the Utah Division of Wildlife Resources, provide teachers and other



educators with opportunities for professional development and a wealth of wildlife education activities and materials for helping students learn about wildlife and its conservation. For a current listing of Project WILD educator workshops, visit the Project WILD

Web site at wildlife.utah.gov/projectwild or e-mail DianaVos@utah.gov. 🐾

Information: Read more on the Web about ecosystem services, threats to ecosystems, solutions, details about things you can do to make a difference and educational resources.

- ♦ actionbioscience.org/environment/esa.html
- ♦ earthsky.com/shows/earthcare/shows.php?s=s&h=Ecosystem%20Services
- ♦ esa.org/ecoservices/wate/body.wate.intr.html (see all links)
- ♦ scienetlinks.com/lessons.cfm?DocID=275 (many excellent educational links)
- ♦ scienetlinks.com/pdfs/ecosystems_extensions.pdf
- ♦ clas.ufl.edu/users/parakh/ecosystem.pdf
- ♦ rand.org/scitech/stpi/ourfuture/NaturesServices/section1.html

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515 East 5300 South, Ogden, Utah 84405
(801) 476-2740

Northeastern Region Office

152 East 100 North, Vernal, Utah 84078
(435) 781-9453

Southeastern Region Office

475 West Price River Drive, Suite C, Price, Utah 84501
(435) 636-0260

Southern Region Office

1470 North Airport Road
PO Box 606, Cedar City, Utah 84721-0606
(435) 865-6100

Poaching hotline: 1 (800) 662-DEER

Web site address: wildlife.utah.gov



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